ORIGINAL RESEARCH PAPER

Physiology

KEY WORDS: Hyperthyroid females, Visual Evoked Potentials,Central neuropathy

TO EVALUATE VISUAL EVOKED POTENTIALS IN HYPERTHYROID FEMALES ATTENDING A TERTIARY CARE HOSPITAL: A CASE CONTROL STUDY

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ABSTRACT

Background: Thyroid disease is a known cause of nervous system dysfunction. Hypothyroidism affect both the electroencephalogram (EEG) and the visual evoked potential (VEP) to flash stimulation, the feature of note in the latter is being a delay in conduction. VEP are electrical p
otential difference recorded from the scalp in response to visual stimuli which is simple, non-invasive electro physiological study.
Aim & Objective: Aim is to evaluate conduction in visual pathway of hyperthyroid females to compare with normal healthy females.
Objective is to use Visual Evoked Potentials to assess conduction in hyperthyroid females.
Materials & Methods: Recording done Electrophysiology Laboratory,Dept.Physiology. Statistical analysis was done by Student unpaired't' test.
Results: There is reduction in latency of P 100 wave which is statistically not significant.
Conclusion: concluded that hyperthyroidism per se has little effect on the VEP and any observed effect on these potentials is probably due to other factors

I.INTRODUCTION

Thyroid disease is a known cause of nervous system dysfunction. Hypothyroidism has been reported to affect both the electroencephalogram (EEG) [1], and the visual evoked potential (VEP) to flash stimulation, the feature of note in the latter is being a delay in conduction [2]. In more recent studies utilising the VEP to pattern stimulation the observed delay was shown to have reversibility after appropriate thyroxine replacement when the subjects becoming euthyroid [3,4].While hyperthyroidism has shown to produce a 'fast' rhythm EEG [5], a feature which was observed to disappear when the patients became clinically euthyroid. So we decided to do investigation of hyperthyroidism[6] using the electrophysiological method, VEP. It is obviously important to know the abnormalities in the VEP that are due to hyperthyroidism if electrodiagnostic techniques are to be used in the treatment of any optic nerve disease which may result from thyroid dysfunction. Visual Evoked Potentials (VEPs) are electrical potential difference recorded from the scalp in response to visual stimuli. It is a simple, non-invasive electro physiological test.

MATERIALS &METHODS

The aim of the study is to to evaluate conduction in optic pathway of hyperthyroid females to compare with normal healthy females. The Objective is to use the Visual Evoked Potentials as a tool to assess conduction in hyperthyroid females.The important parameter wave latency of the cortical electrical response at 100 msec, P 100 measured in hyperthyroid females to compare with the age matched normal healthy females. The study was approved by the Institutional Ethical Committee.30 hyperthyroid subjects were selected from endocrine clinic of our Hospital. 30 age matched normal healthy controls from the Master Health Check Up.

Inclusion criteria: Females, Age 20 to 50 years**,** Thyroid function tests: serum TSH, free T4**,**TSH Value < 0.1mU/L done in our hospital laboratory. Diagnosed hyperthyroid (biochemically proved) by endocrine unit. Visual acuity checked.

Exclusion criteria: Systemic diseases like diabetes mellitus, hypertension, cardiac diseases, renal disorders, demyelinating neuromuscular disorders, metabolic encephalopathy, drugs acting on central nervous system, habitual history of smoking and alcohol drinking. Terminally ill, corneal opacity, squint, colour blindness, myopia, astigmatism, cataract, glaucoma, maculopathy and use of miotic or mydriatic drugs,

The written informed consent was received from each study subject . The detailed procedure and purpose of the study was explained to her. The basic parameters as height, weight, pulse rate including body temperature were recorded.

VEP recording is done in electrophysiology Research Laboratory, Department of Physiology, Computerised NeuroPerfect Plus Medicaid Polyrite was used.

The study group were instructed to have their scalp oil free and remove metallic jewels. The skin and the electrodes electrical impedance checked. Automatic artefact rejection is used. Electrical activity had low cut 2 Hertz and high cut 0.3 Kilo Hertz filters. Disc surface electrodes used. Sweep speed was 50ms/division. Mono ocular stimulation was chosen with flash checker board. The checker board stimulus was produced by a video pattern generator on a computer monitor provided with the polyrite. Luminance modulation of the pattern was selected to give the reversal mode of stimulation at a rate of 2 per second. The check size was 8 × 8 and the monitor 16'× 14'. The luminance of bright and dark checks was adjusted to be 80%. The black and white monitor placed 100 cm from the study subject. Gold plated copper disc electrodes placed with electrode paste after cleansing the skin with spirit and cleansing gel. The 10 – 20 international electrode placement was followed: Reference – Cz 15 cm from bridge of nose at vertex, active – Oz 5 cm above the inion and ground Pz at middle of forehead. Responses to100 stimuli were averaged. The signals were amplified, averaged and displayed on the monitor as a waveform. The signal is amplified 50,000 times and band pass filtered between 0.1-100 Hz. Two averages were obtained under each stimulus condition to check for consistency, and quantitative analysis was performed on the average of these two. The study subjects were given short periods of rest between each separate measurement so as to minimize fatigue and any concomitant increase in response variability. With respect to latency, P 100 component was analysed. Permanent records of the responses were made. The subject was instructed to fix her gaze at the centre of the checker board, a red square to avoid interference of potentials from movement of eyeball. Prior to commencement of the test the subject is pre adapted to the luminance of the blank screen for five minutes. This was the only source of illumination in an otherwise darkened room. The other eye covered with opaque material that does not allow light. All techniques of measurement, instruments maintained uniformly throughout the study.

RESULTS

The characteristics of VEPs from the left and right eyes as N 75, P 100*, N 145, P 100 – N 75 were noted from the waveform recordings.

Table no: 1 BASELINE CHARACTERS

Variables	Hyperthyroid	Control	P value
Age (years)	32.65 ± 6.53	35.65 ± 6.53	0.05
Height (cms)	152.13 ± 3.42	155.10 ± 2.24	0.05
Weight (kg)	36.33 ± 10.14	56.20 ± 8.12	0.05
BMI(Kg/m^2)	18.67 ± 3.21	23.36 ± 3.85	0.05

BMI = Body mass Index

Table no: 2 Wave Latency P 100 compared between Hyperthyroid and controls

Variables P 100	Hyperthyroid N = 30 Mean ± S.D	Controls N= 30 Mean ± S.D	P value
Left eye	89.52 ± 2.65	96.86 ± 6.01	0.06
Right eye	90.03 ± 2.79	96.91 ± 6.03	0.06

P value < 0.01 is significant.

Statistical analysis was done by Student unpaired't' test using SPSS software 15 version for analyzing latency values between study group and controls. The level of significance chosen for the study was 1% ($p < 0.01$).

Interpretation: Reduction in latency P 100 in hyperthyroid females not statistically significant.

Limitations

A cross sectional design do not know the exact duration of affect of illness. A follow up study is needed to record VEP after the subjects become euthyroid.

DISCUSSION

Thyroid hormone effects myelination. The excess of thyroid hormone uncouples oxidative phosphorylation, leads to release of more heat instead of energy results in enhancing conduction in nerves might have caused of reduction in latency P 100. From the results of this study it would seem that high levels of circulating thyroid hormone have little affect on conduction in the visual pathways, as no significant changes in VEP latency were observed.

CONCLUSION

Follow up of study subjects after treatment with L-thyroxine to find whether the changes are reversible following achievement of normal levels.

To conclude electrophysiological studies can be useful in the earlier diagnosis of asymptomatic polyneuropathy in hypothyroid as well as hyperthyroid subjects, it should be remembered that this does not occur in every case and even when it does, only slowly after a prolonged alteration in thyroid hormone level.

Electrophysiological studies as VEP, are considered the most objective and sensitive method of detecting early optic nerve abnormalities. We need to improve our sample size and involve both the genders also in future study.

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